

Claims

1. An in-line filter provided with a substantially elongated filter housing (1; 51) in which filtering material (A) is included, the filter housing being provided on a first end with an inflow opening (2) and on a second, opposite end with an outflow opening (3), while at the inflow opening (2) and the outflow opening (3) fastening means (4 – 7) are provided for fastening a supply or discharge tube, respectively (8 or 9, respectively), wherein the fastening means (4 – 7) are quick-change couplings (4 – 7), a respective quick-change coupling (4, 5; 6, 7) having a coupled condition and an uncoupled condition, while in the quick-change coupling (4, 5; 6, 7) a shut-off valve (10) is provided which, in the coupled condition, assumes an open position and thus allows gas to pass and which, in an uncoupled condition, assumes a closed position and thus does not allow gas to pass.
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2. An in-line filter according to claim 1, wherein the shut-off valve (10) of the quick-change coupling (4, 5; 6, 7) forms part of the part (4, 6) of the quick-change coupling that remains connected to the supply or discharge tube, respectively (8 or 9, respectively), such that in the uncoupled condition, the supply or discharge tube, respectively (8 or 9, respectively) is hardly, if at all, polluted by air.
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3. An in-line filter according to claim 1 or 2, wherein each quick-change coupling comprises a male part (4, 6) and a female part (5, 7) through which a bore (11) extends, which forms the fluid communication between the supply or discharge tube, respectively (8 or 9, respectively) and the inflow opening (2) or outflow opening (3) respectively, of the filter housing (1; 51), while, with the male part (4, 6) and the female part (5, 7) in coupled condition, the quick-change coupling (4, 5; 6, 7) is in the coupled condition and with the male part (4, 6) and the female part (5, 7) in uncoupled condition, the quick-change coupling (4, 5; 6, 7) is in the uncoupled condition.
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4. An in-line filter according to claim 2 and 3, wherein the male parts (4, 6) of the two quick-change couplings are connected to the supply or discharge tube, respectively (8 or 9, respectively).

5. An in-line filter according to any one of the preceding claims, wherein the female parts (5, 7) are connected to the two ends of the filter housing (1; 51).

6. An in-line filter according to at least claim 3, wherein in the bore (11) in the male part (4, 6) a sieve (12) is included.

7. An in-line filter according to at least claim 3, wherein each male part 10 (4, 6) is provided with a clamp fitting (27) for connecting the male parts (4, 6) to the supply tube (8) and the discharge tube (9), respectively.

8. An in-line filter according to at least claim 3, wherein at each quick-change coupling, the shut-off valve (10) is included in the bore (11) in the male part (4, 6).

15 9. An in-line filter according to claim 8, wherein the shut-off valve (10) is biased in a closed position by a spring (13).

10. An in-line filter according to claim 9, wherein the shut-off valve (10) comprises a valve body (14) and a valve stem (15), the valve body (14) being arranged for cooperation with a valve seat (16) in the bore (11) of the male 20 part (4, 6), the valve stem (15) being provided with a collar (17) against which the spring (13) rests with a first end, while another end of the spring (13) rests against a supporting surface (18) provided in the male part (4, 6), as a constriction is provided in the bore (11), while, when the male part (4, 6) is placed in the female part (5, 7), with an end facing away from the valve 25 body (14), the valve stem (15) meets a stop (19) in the female part (5, 7) such that movement against the spring force of the spring (13) is effected.

11. An in-line filter according to claim 10, wherein between the valve body (14) and the valve seat (16) a flexible sealing ring (20) is provided.

12. An in-line filter according to claim 10 or 11, wherein the stop (19) in 30 the female part (5, 7) comprises a Teflon cap (19) which cap, when the male

part (4, 6) is placed in the female part (5, 7), is pierced by the free end of the valve stem (15) provided to that end with a sharp point.

13. An in-line filter according to at least claim 3, wherein, with the aid of screw thread (21), the male part (4, 6) can be connected to the female 5 part (5, 7).

14. An in-line filter according to claim 13, wherein screw thread (21) on the male part (4, 6) is provided on a fastening ring (22) rotatably connected to the male part of (4, 6) such that only the fastening ring (22) needs to be turned for fastening the male part (4, 6) in the female part (5, 7) and that therefore 10 the remaining parts of the male part (4, 6) need not be rotated.

15. An in-line filter according to at least claim 3, wherein the connection between the female part (5, 7) and the filter housing (51) is formed by a detachable connection.

16. An in-line filter according to claim 15, wherein the connection is 15 formed by a clamp joint, to which end the female part (5, 7) is provided with a body (23), a clamping plate (24) which can be connected to the body (23) with the aid of fastening bolts (25) and with a flexible clamping ring (26) with a diameter that fits the outer circumference of the filter housing (51).

17. An in-line filter according to any one of the preceding claims, 20 wherein around the filter housing (51) a protective shell (52) is provided.

18. An in-line filter according to claims 3 and 17, wherein the protective shell (52) is included between the two female parts (5, 7).

19. An in-line filter according to any one of the preceding claims, 25 wherein the filtering material (A) in the filter housing (1; 51) is nanochem® or IPX®.

20. An in-line filter according to any one of preceding claims, wherein the filter housing (1; 51) and the optional protective shell (52) are at least partly transparent, for instance in that the filter housing (1; 51) is manufactured from glass and in that the protective shell is manufactured from

acrylic plastic, while in the filter housing (1; 51) an indicator is included which discolors when the filtering material (A) is saturated.

21. An in-line filter according to any one preceding claims, wherein the filter is provided with a transponder (27).

5 22. An in-line filter according to any one of the preceding claims, wherein the transponder is provided with a temperature sensor, while the transponder is placed on the filter housing (1; 51) adjacent a downstream end of the filter housing (1; 51).

10 23. A filter provided with a filter housing in which filtering material is present for removing water, oxygen and hydrocarbons from a gas flow, while the filtering material does not contain alkali metals or alkaline earth metals.